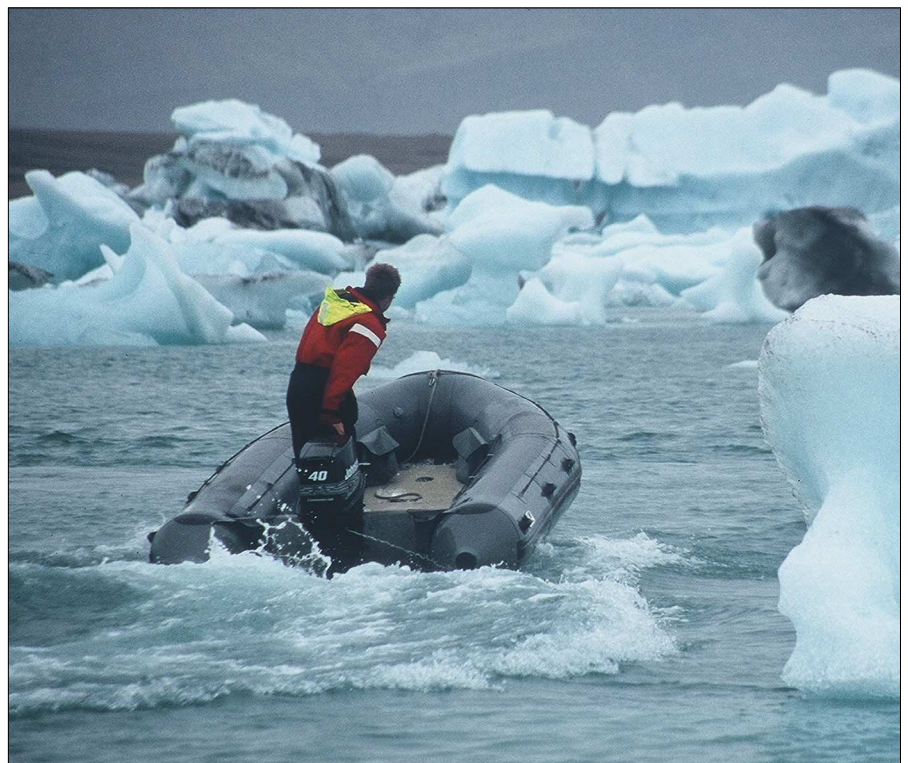


Curbing Climate Change

IS THE WORLD DOING ENOUGH?

The scientific consensus on global warming is sobering: It's real, it's happening now and carbon-dioxide emissions caused by the burning of fossil fuels are almost certainly responsible. Predicting what the exact effects will be on humanity and the planet's living resources is trickier, but a growing body of evidence suggests they will be profound. The international community generally — and the European Union in particular — take the threat very seriously, and most wealthy industrial nations have adopted mandatory limits on carbon emissions under the 2005 Kyoto Protocol. The United States — the world's largest carbon emitter — has refused to sign the protocol or adopt mandatory limits, and is seen by other nations as obstructing progress on the issue. Kyoto expires in 2012, and world governments are working on a successor agreement. Many experts say the effort will fail without active U.S. leadership and the participation of major developing-world polluters such as China and India, with potentially dire consequences.

In southern Iceland, the recent and fast-moving meltdown of Breidamerkurjökull Glacier has formed a deep lake that already threatens to inundate the coastal highway. Rubber boats take tourists out to view the broken ice and see evidence of what could be climate change.



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Curbing Climate Change

BY COLIN WOODARD

THE ISSUES

From the shores of Jokulsarlon Lagoon, the view of Iceland's ice cap is breathtaking: A vast dome of snow and ice, 3,000 feet tall, smothers the jagged mountains; a glacier spills the 12 miles down to the water's edge.

More stunning is how fast it's all vanishing.

A century ago there was no lagoon, and this spot was under 100 feet of glacial ice. The glacier, the Breidamerkurjokull, extended to within 250 yards of the ocean. Now the Atlantic is more than two miles away from the glacier's massive, miles-wide snout, which stands in an expanding lake of its own melt water. Jokulsarlon — "glacier lake" in Icelandic — is now more than 350 feet deep and has more than doubled its size in the past 15 years, threatening to wash out Iceland's principal highway.

In the 250 miles between the lake and Reykjavik, Iceland's capital, the highway passes by another dozen glaciers, all of them steadily retreating back up the valleys they once filled. Stand on their snouts and you hear cracking, moans and the gurgle of the many streams of water pouring from their insides, feeding unruly brown rivers that rush toward the sea. As they retreat, a new landscape scrolls out from underneath, places that haven't seen the light of day since medieval times.

Iceland is losing its ice, and it's not alone. Greenland's 10,000-year-old ice sheet is retreating at a rate that has astonished scientists who study it. Arctic Ocean sea ice has shrunk by 6 percent since 1978, while the average thickness has declined by 40 percent

in recent decades, threatening polar bears, seals and the Inuit people who hunt them. (See sidebar, p. 38.)

In Antarctica enormous floating ice shelves have disintegrated, and many of the glaciers that empty the West Antarctic ice sheet have picked up speed, raising the possibility that a large portion of the southern ice cap may break up, which would quickly raise world sea levels by 20 feet.

Mid-latitude glaciers are vanishing as well. All appear to be the result of significant increases in average temperatures: 0.6 degrees Celsius (1.1 degrees Fahrenheit) globally and 1.6 degrees Celsius in the Arctic during the 20th century. ¹



In front of the U.S. Embassy in London, the "Statue of Taking Liberties" holds the torch of protest against the U.S. withdrawal from the Kyoto Protocol, which places limits on greenhouse gases created by burning fossil fuels.

Newsweek/Sion Touthig

Iceland's president, Olafur Ragnar Grimsson, has invited fellow world leaders to come to Iceland and bear witness. "Nowhere in the world can you see traces of climate change as clearly as in the North," he said. "It's an important mission." ²

The vast majority of the world's scientists are now convinced that the warming of the past 50 years has largely come from greenhouse gas emissions, mostly created by the burning of fossil fuels. The "greenhouse effect" is how the Earth retains much of its warmth from the sun, as certain gases in the atmosphere trap some of the radiation reflected off the planet's surface and warm the planet.

Greenhouse gases (GHG) occur naturally in the atmosphere and include water vapor, carbon dioxide, methane, nitrous oxide and ozone. But human activity has been boosting the concentrations of some of them, most notoriously the carbon dioxide (CO₂), which is released

by burning fossil fuels. The overproduction of man-made gases has been blamed for much of the excess retention of heat in the atmosphere that has contributed to global warming.

"Everything we're seeing in the Arctic is 100 percent consistent with that," says Robert Corell, a senior fellow at the American Meteorological Society in Washington, D.C., who oversaw the Arctic Climate Impact Assessment, a four-year study involving 300 scientists from around the world.

A climate study conducted by the U.N. Intergovernmental Panel on Climate Change (IPCC), released on Feb. 2, 2007, flatly states that the climate-change debate is over. ³ "Feb. 2 will be re-

CURBING CLIMATE CHANGE



AFP/Getty Images/Toru Yamataka

Japanese activists and advocates for now-endangered polar bears cheer the signing of the Kyoto Protocol in 2005, requiring cuts in carbon emissions. The treaty has the support of 169 nations; only Australia and the United States, among industrialized nations, refused to join.

membered as the date when uncertainty was removed as to whether humans had anything to do with climate change on this planet,” said IPCC Executive Director Achim Steiner. “The evidence is on the table.”

Made up of more than 1,000 scientists from 113 countries, the IPCC said new research over the last six years shows with 90 percent certainty that human-generated greenhouse gases have caused most of the rise in global temperatures over the past half-century. “Warming of the climate system is unequivocal,” said the IPCC’s “Summary for Policymakers” — one of four reports scheduled for release this year.⁴ The IPCC generally is considered a cautious body because all participating governments must sign off on its conclusions.

“We know the climate is changing and that we have a 10- or 20-year window to address it,” says Hermann Ott, a climate expert at Germany’s Wuppertal Institute. “It’s very urgent that we act at both the national and international level pretty soon.”

The industrial powers, which produce most of the world’s pollutants, are in the best position to act. And it has

been the 27 nations of the European Union (EU) that have spearheaded efforts to reduce greenhouse gas emissions. They have acted in large part because of widespread public concern — sparked by recent climactic extremes witnessed in their home countries.

Europe was hit with a devastating summer heat wave in 2003 that killed 25,000 people; roads buckled in Germany and water levels on the Danube plunged to record lows, forcing a suspension of the Budapest-Vienna hovercraft service and allowing illegal migrants to wade between Romania and Bulgaria. The year before, torrential rains triggered devastating floods across Central Europe, causing \$15 billion in damages. Last winter many Austrian ski resorts were unable to open in December because it was not cold enough to make snow.⁵

European leaders are so convinced of the seriousness of global warming that — in a dramatic announcement on March 9 — they unilaterally committed themselves to more than double the amount of greenhouse gases they had promised earlier to scour from their emissions.⁶

Yet skeptics remain, even in Europe. Henrik Svensmark, a weather scientist at the Danish National Space Center, for instance, believes that changes in the sun’s magnetic field — and the corresponding impact on cosmic rays — not greenhouse gas emissions, may be the key to global warming.⁷

Habibullo Abdussamatov, head of the research laboratory at Pulkovo Astronomical Observatory in St. Petersburg, Russia, takes a similar non-mainstream position.⁸

That global warming exists is not new to the Inuit. The Inuit Circumpolar Conference, which represents 150,000 people living in the High Arctic, recently filed a protest with the Inter-American Commission on Human Rights, charging that U.S. greenhouse gases are destroying their homes and livelihoods. (See sidebar, p. 38.)

And residents of low-lying Pacific island nations fear their entire countries may be eliminated as melting ice causes oceans to rise.⁹ (See sidebar, p. 34.)

“We are frightened and worried. And we cannot think of another Tuvalu to move to . . . if nothing is done urgently and we are forced out of our islands,” Tuvalu Ambassador Enele Sosene Sopoaga told the U.N. General Assembly last fall.¹⁰

Climate experts in the United States and abroad say they expect the United States to become more aggressive about climate change after the 2008 presidential election, regardless of which party wins. They cite many factors, including the Republican defeats in the 2006 midterm elections, muscular action by state and city governments to reduce emissions and increasing pressure for substantive action from corporate and religious leaders such as Boeing, General Electric, BP, the U.S. Conference of Catholic Bishops and the Baptist General Convention of Texas.¹¹

“The rest of us are waiting to see when and how the U.S. will re-engage in climate issues, says Harald Winkler, principal scientific officer at the Uni-

versity of Cape Town Energy Research Center in South Africa. "The large, carbon-emitting developing countries aren't going to make a move until the U.S. federal government moves."

Uncertainty over U.S. action has complicated international efforts to develop a successor to the Kyoto Protocol, the international agreement that expires in 2012, under which 41 of the world's industrialized countries — but not the United States — agreed to reduce their greenhouse gas emissions. Experts say that significantly reducing global GHG emissions hinges not only on U.S. participation but also participation by large developing countries like China, India and Brazil.¹² China, where the economy has been growing at more than 9 percent a year for more than two decades, is expected to surpass the United States as the world's largest carbon emitter in 2009.¹³

Critics of Kyoto — led by the United States — say the protocol has little hope of significantly reducing emissions as long as China and India are exempt. But these countries say they are lifting tens of millions out of poverty and that they should not be penalized for pursuing the same heavily polluting development path the rich industrial nations followed.

To address the challenge of global warming, many argue, the international community must find a mechanism by which rich nations help poorer ones adopt clean energy and transportation technologies and adapt to the effects of a changing climate.

As the world's leaders grapple with climate change, here are some of the questions being debated:

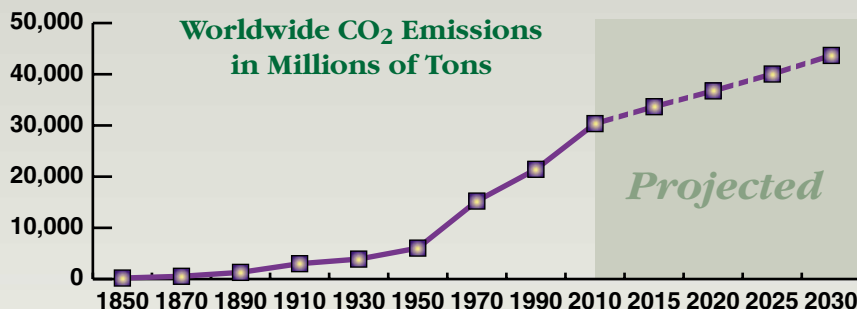
Are all countries doing their part to control global warming?

The short answer is no, although most are doing far more than the United States.

To date, 169 countries have signed the Kyoto Protocol, including every industrial nation except Australia and the

Global Carbon Dioxide Emissions: 1850-2030

For most of human history, carbon-dioxide emissions were irrelevant to climate. But only decades after the dawn of the Industrial Age, the accumulation of carbon dioxide generated by the burning of fossil fuels began to noticeably change the lower atmosphere. Now carbon emissions threaten to spiral past our ability to control their effects on global warming.



Source: "Climate Change 101: International Action," Pew Center on Global Climate Change

United States. Kyoto, which went into effect in 2005, has been a polarizing agreement. Its supporters call it only a baby step toward confronting climate change; its detractors — most of whom now agree that global warming is real — say it already has slowed economic growth without making a meaningful reduction in greenhouse gas emissions.

Under the agreement, the 41 wealthy countries agreed to collectively reduce their emissions 5.2 percent below 1990 levels by 2012. The EU committed to an overall 8 percent reduction, Japan and Canada to 6 percent. But few countries appear on target to meet their commitments. As of 2004, Canada's emissions had increased 26.6 percent over 1990 levels, and Japan's by 6.5 percent; European Union (EU) emissions had decreased by just 0.6 percent.

Within the EU, Great Britain reduced its emissions by 14.3 percent and Germany by 17.3 percent, but those gains were offset by substantial increases in Greece (26.6 percent), Portugal (41 percent) and Spain (49 percent).¹⁴

In their March 9 announcement of new emission-reduction goals, howev-

er, EU leaders agreed to unilaterally reduce their overall emissions to 20 percent of 1990 levels within 13 years and use renewable sources for one-fifth of their electric power. They also vowed to use biofuels in 10 percent of road vehicles by 2020.¹⁵

French President Jacques Chirac called the decision to make unilateral reductions one of the "great moments in European history." And in a clear challenge to the United States, China and India, German Chancellor Angela Merkel said the EU's 27 members would commit to a 30 percent reduction if other countries followed suit. The plan will be presented to President Bush and other world leaders in June.¹⁶

Why has the United States been so cool to Kyoto? Some American critics see the treaty as a misguided piece of "one-worldism" that will wreck the U.S. economy. Others argue that it doesn't really matter, that following Kyoto guidelines is unlikely to have a significant effect on global warming, primarily because new megaeconomies such as China, India and Brazil have not signed on to control their emissions.

CURBING CLIMATE CHANGE

Thomas H. Wigley, a senior scientist at the National Center for Atmospheric Research in Boulder, Colo., estimated that even if the United States had joined Kyoto and all countries met and stuck to their targets, warming in 2100 would be reduced by a mere 8 percent. Wigley is against Kyoto, but only because he advocates a far stronger commitment to reducing gases.

Many around the world saw the hesitation of the United States as self-serving. "Of course, the consensus is that the president is paying his dues to

sions. "It is only the first battle in the war against climate change," says Tony Juniper, vice chair of the Amsterdam-based Friends of the Earth International, since "the commitments made by governments under Kyoto do not go anywhere near far enough." ¹⁸

Unfortunately, nobody knows exactly what "far enough" is. Scientists do know that since the Industrial Revolution, greenhouse gas concentrations in Earth's atmosphere have increased from 280 parts per million (ppm) of carbon dioxide to 379 in 2005, while the world

One of the most important accomplishments of the European Union is the creation of the Emission Trading Scheme (ETS), which is based on the premise that the free market is the most cost-effective way to reduce carbon emissions. First, member governments assigned binding carbon-emission quotas to large polluters, effectively creating an artificial "shortage" in polluting rights. Then an emissions commodity market was set up. Companies needing to emit more carbon dioxide could buy credits from those producing less, or from developing nations, who could use the money on U.N.-certified projects that cut or absorb emissions.

The system has its downsides, such as sharp increases in electricity prices as utilities pass the cost of buying credits on to consumers. In Germany, for instance, off-peak prices for electricity doubled in just two years, largely because much of the power there comes from burning coal, which produces more greenhouse gases than other fossil fuels.

"ETS has had its share of problems, but it has been a really very valuable learning experience," says Eileen Claussen, president of the Pew Center on Global Climate Change. "They've figured out how to make it work well and have gotten a lot of private-sector players invested in the new carbon-trading market. It's definitely part of the way forward for the rest of us." ²⁰

Denmark has become a global leader in developing technologies and policies to reduce greenhouse gas emissions. Its government supports the wind-energy industry, which now provides a quarter of Denmark's electricity and supplies the majority of wind turbines in use elsewhere in the world. Wind turbines dot the countryside like giant pinwheels, while huge offshore wind farms capture the stiff winds in the Baltic and North seas.

Authorities in the Danish capital, Copenhagen, have deployed 2,000 bicycles in public locations around the city, which can be borrowed for free;



Getty Images/Paula Bronstein

A rush-hour cloud of pollution drapes Bangkok, Thailand, on Feb. 2, 2007, the day that a report by the International Panel on Climate Change (IPCC) asserted that climate changes very likely have been caused by human burning of fossil fuels, and that global temperatures are expected to rise by three degrees Celsius by 2100.

Big Oil and Big Metal for supporting his election," wrote Scottish columnist Charles Fletcher, "and of course that is, to us, outrageous. But money is unsentimental. The fight against global warming and pollution should be equally clear-eyed in its assessment of what just happened."

In Fletcher's eyes, "What happened was that the American president was honest and spoke plainly, and we should start dealing with it. He said: 'I will not accept anything that will harm our economy and hurt our American workers.' " ¹⁷

Kyoto's proponents argue that it has been an essential first step and has yielded benefits simply by focusing attention on the need to reduce emis-

has warmed by more than 0.6 degrees Celsius. A British government study suggests that if current emissions trends hold, the concentration will reach 550 ppm by 2035 and likely increase average temperatures by another 2 degrees C. While 2 degrees may not sound like much, average temperatures during the last Ice Age were only 5 degrees Celsius lower than they are today. ¹⁹

"At Kyoto, the countries of the world sat down and talked about what reductions they could manage," says Alex Evans, a senior policy associate at the Center on International Cooperation (CIC) at New York University. "Now we need to ask ourselves what level of risk we are actually prepared to tolerate."

a heavy sales tax on automobiles discourages their purchase. The country is home to the world's largest solar-powered district heating station — a 12-megawatt facility on the island of Aero — and hundreds of special plants that process kitchen and farm wastes into fertilizers and clean-burning methane fuels.

“Planning for the environment has always been popular in Denmark,” explains Christian Matthiessen, a geographer at the University of Copenhagen. “We’re an agricultural nation where nobody lives more than 30 miles from the sea. The environment has always played a role for everybody.”²¹

Tiny Iceland, population 280,000, intends to go even further by withdrawing from the carbon economy altogether. In 1998 the government committed itself to using the island's enormous geothermal resources to charge hydrogen fuel cells, whose only waste product is water vapor. Cells would then be used to power cars, boats and other energy needs that can't be directly met by geothermal and hydro resources.

“Our vision is that when we have transformed Iceland into a hydrogen economy, then we are completely independent of imported fossil fuel,” says the father of the plan, Bragi Arnason of the University of Reykjavik. “There will be no greenhouse gas emissions from our fuel.”²²

But Iceland and Denmark are tiny nations, and it is clear that meaningful reductions of global emissions would have to include not only the United States but also China, India and other rapidly industrializing nations.

Between 1990 and 2004, U.S. annual greenhouse gas emissions increased by 16 percent, the equivalent of the total combined annual emissions of Great Britain, the Netherlands and Finland. India's emissions increased by about 60 percent and China's by roughly 70 percent.²³

“China's environmental issues are no longer just China's issues,” says

Bangladesh Faces Catastrophic Flooding

Thirty million residents of Bangladesh would lose their homes if the sea level rises three feet at the end of the century, which some experts predict (red line on map). Pedicabs slosh through flooded streets in Dhaka. The low-lying, densely populated region of the Indian subcontinent lies mostly in the Ganges River delta and is vulnerable to sea-level rises that may be caused by melting polar glaciers.



Sources: ESRI and UNEP



AFP/Getty Images/Farjana K. Godhuly

Jianguo Liu, who holds the Rachel Carson Chair in Sustainability at Michigan State University and is a guest professor of the Chinese Academy of Sciences. "They've become global issues.

Should rich nations assist poor ones in fighting global warming?

As the world decides what to do after Kyoto expires, perhaps the paramount question has become how to fairly and effectively engage the developing world. Most critical will be working out a compromise under which rich countries agree to help poor ones reduce their emissions and adapt to the disasters and displacements expected to follow the ongoing change in climate.

Rich countries are likely to help poorer ones with emissions reduc-

tions because it is in their own interest to do so, at least with regard to the largest polluters. "Basically there is no way that we can force China and India to contribute to mitigating climate change," says Ott of the Wuppertal Institute. "They're saying, 'we are developing the way we learned it from you, and when we reach your level of wealth, we'll start caring about the climate, just as you did.' " For this reason, many experts say rich countries will need to help developing ones help themselves.

Various developing countries require different sets of expectations, argues Ott, who convened a series of meetings with experts from developing countries to try to find equitable solutions. In short, he says, newly industrialized countries,

such as South Korea and Taiwan, should be reducing emissions without outside support, while rich countries should help rapidly industrializing nations such as China, India and Brazil with investments that will put them on a cleaner path. Other nations with little culpability for the problem and even fewer resources to confront it, such as Liberia and Bangladesh, shouldn't be expected to do much on their own.

"Most of the additional greenhouse gases in the atmosphere today are due to the past industrialization of the developed countries, so they must take the lead in combating climate change," says Winkler of the University of Cape Town. "We all need to be doing something, but each of us will be doing different things based on what we are

Pacific Islanders' Sinking Feeling

Tiny nations face inundation

People in the Republic of the Marshall Islands have a lot to lose if global warming causes the seas to rise as much as scientists think they could. Their entire nation would cease to exist.

The Marshallese live on 1,100 islands spread across three-quarters of a million square miles of the central Pacific Ocean. Most of the islands are small, so small that if you added them all together, you would have a parcel of land no bigger than the District of Columbia.

A few are no more than a couple hundred yards wide, and their average elevation is just seven feet above sea level. They're arranged in 29 sandy, ring-shaped chains called atolls. Stand most anywhere on Majuro Atoll, the capital and home to one-third of the country's 58,000 people, and you can hear the surf crashing on either side of you.¹

Small island states are among the most vulnerable to climate change. Many of them will not be able to adapt by retreating from the coastal zone. There isn't anywhere else to go. The International Panel on Climate Change (IPCC) notes that land lost to sea-level rise and associated effects "is likely to be of a magnitude that would disrupt virtually all economic and social sectors in these countries."²

Understandably, the governments of places like the Bahamas, Fiji and the Federated States of Micronesia have been among the most vocal critics of the U.S. and other governments that have opposed aggressive action on climate change.

Atoll nations like Kiribati, the Maldives, Tuvalu and the Marshall

Islands are doubly vulnerable because they are literally built on the backs of reef-building corals that formed the islands and today protect them from storms. According to a study by the Tyndall Centre for Climate Change Research in the United Kingdom, the predicted increase in sea-surface temperatures can be expected to damage and kill the relevant corals through bleaching, preventing them from keeping pace with rising seas.³

Signs of erosion are everywhere on Majuro. Beaches have vanished, seawalls have been battered down and chunks of the main road have been swept away by the sea. At a cemetery in the middle of town, islanders have to keep reburying their relatives because the sea keeps uncovering their coffins during storms. There are no rivers in the Marshall Islands; people rely on a thin "lens" of fresh groundwater for drinking and irrigation, but more and more of those lenses are becoming contaminated with brine.

On Majuro, some of those changes may be the result of poorly conceived developments and the mining of lagoon sand for use in construction, acknowledges Holly Barker, a senior adviser to the Marshallese ambassador to the United States. "It's true that on Majuro there are some human impacts, but we see exactly the same effects on the outer islands, where people are still living sustainably off the land and there is no industry whatsoever," says Barker, who previously lived on remote Mille Atoll as a Peace Corps volunteer. "On Mille there are these huge gun turrets that the Japanese built 100 yards inshore during World War II so that U.S. vessels coming in wouldn't see them. Now they're standing out in the water."

A 1992 study of Majuro Atoll by the National Oceanic and Atmospheric Administration (NOAA) determined that if sea levels rise by three feet, the atoll will cease to exist. Defending the atoll from a 50-year storm event would be impossible in such a case, and NOAA has issued a sober policy recommendation: "Full retreat of the entire population of Majuro Atoll and the Marshall Islands must be considered in planning for worst-case [sea-rise] and climate-change scenarios."⁴

"For the Marshall Islands, climate change is an issue of sovereignty," Barker says. "The Marshallese have extremely low carbon emissions. Other countries' lifestyle habits don't give them the right to take away a nation. Where will the Marshallese go? Will they still have a voice at the United Nations? Will they cease to be a nation?"

In 2001, Tuvalu, another Pacific atoll nation, convinced New Zealand to take an annual quota of refugees, so as to allow an orderly evacuation of the nation. "While New Zealand responded positively in the true Pacific way of helping one's neighbors, Australia on the other hand has slammed the door in our face," Paani Laupepa of the Tuvalu Ministry of Natural Resources, said at the time.

He also had sharp words for the United States, saying that its refusal to ratify the Kyoto Protocol had "effectively denied future generations of Tuvaluan their fundamental freedom to live where our ancestors have lived for thousands of years."⁵

Should it come to that, the most likely refuge for the Marshallese would be the United States, which governed the islands for more than 40 years after World War II under a mandate from the United Nations. The U.S. Postal Service still



Mieco Beach Yacht Club

Children of the Marshall Islands in the South Pacific may lose their world if the oceans rise even a few feet. The islands are spread across low-lying atolls. Refugees from the Marshalls are already immigrating to New Zealand as the global temperature rises.

delivers the mail within the country, and Marshallese serve in the U.S. military in relatively large numbers.

¹ The author has reported on climate change from the Marshall Islands in both 1997 and 1999. For a full report see Colin Woodard, *Ocean's End* (2000), pp. 163-189.

² International Panel on Climate Change, "Climate Change 2001," Section 17.2.2.1.

³ Jon Barnett and Neil Adger, *Climate Dangers and Atoll Countries*, Tyndall Centre, October 2001, p. 4.

⁴ P. Holthus, *et al.*, "Vulnerability Assessment of Accelerated Sea-level Rise, Case Study: Majuro Atoll, Marshall Islands, Apia, Western Samoa," South Pacific Regional Environment Program, 1992.

⁵ "Pacific islanders flee rising seas," BBC, Oct. 9, 2001, 20:29 GMT.

responsible for and what we are capable of, given our situation."

Assistance could yield considerable benefits. China alone expects to build more than 500 new power plants in the next five years. Left to its own devices, China would build conventional plants that would be used for decades. If the outside world were to help transfer the latest pollution-control technology, the growth in China's emissions would be considerably slower.

"Give them a chance to develop, but by leapfrogging over that phase with bad windows, bad air conditioners, dirty coal plants and the internal combustion engine," says Stephen Schneider, co-director of Stanford University's Center for Environmental Science and Policy. Such technology trans-

fers would also provide a cost-effective means for Western companies to earn credits under an ETS.

Building a high-tech, low-emissions plant in India, for example, where labor and material costs are low, would be far cheaper than replacing an existing high-emissions plant in, say, Indiana. "For the planet, a ton of carbon in Beijing is the same as a ton of carbon in Boston or Brussels," Schneider notes. "So everyone wins."

Western companies are reluctant to deploy new technologies to many developing countries, largely because of the poor state of intellectual-property protection in the Third World. "You don't want to give up a more efficient technology if it is just going to be copied, because then, what do you

have left?" says C. S. Kiang, dean of the College of Environmental Sciences at Peking University in Beijing. Part of the solution, he says, would be to give recipient countries ownership of some subset of the deployed technology. "China's never had intellectual property of its own before, but once they own some they will respect it," he says, creating a "win-win situation" for both parties and the environment.

While the ETS gives Western countries incentives to help rapidly developing parts of the world, they have fewer incentives to help poor countries adapt. Building Dutch-style defenses to protect densely populated, low-lying areas of Bangladesh from rising seas and stronger storms, for example, would cost billions of dollars, with little or no



CQ Press/Pritt Vesilind

Wind turbines harness the stiff winds on the Baltic Sea, in the channel between Denmark and Sweden. More than 20 percent of Denmark's electricity is generated by wind, an alternative to the burning of fossil fuels, blamed for global warming.

financial return for rich countries. The argument, therefore, is a moral one.

The expected impacts of global warming — more frequent and severe floods, droughts, heat waves and storms — are expected to fall most heavily on poor nations. An estimated 97 percent of deaths related to natural disasters occur in developing countries, which generally have poorer sanitation, flood control and health-care infrastructure.²⁴

Even when Hurricane Katrina hit New Orleans, the poor suffered the most. “People with resources can move and rebuild and start new lives in the event of hurricanes or other disasters,” says the Pew Center’s Claussen. “But poor people often have nowhere else to go, nowhere else to turn, no resources to make the changes in their lives that will protect them from this global problem.” In this respect, she suggests, the world is like New Orleans writ large.²⁵

A draft IPCC report offers stark predictions — based on new research — on the coming effects of global warming, especially on poor people. Leaked to The Associated Press in March, the report — the second of four IPCC studies being issued this year — predicts that hundreds of millions of Africans and tens of millions of Latin Americans could face water shortages within 20 years, and more than 1 billion people in Asia could face water shortages by 2050.

While some regions may produce more food thanks to a longer growing season, that will be only temporary, the report said. By 2080, between 200 million and 600 million people could face starvation, water shortages could threaten 1.1 to 3.2 billion people and about 100 million people could be flooded each year, according to the report.²⁶

Will reducing greenhouse gases harm the global economy?

Despite some bravado, virtually everyone agrees that a lot of money will have to be spent if the world is to see a substantial reduction in greenhouse gas emissions. The biggest disagreements lie in whether the cost of mitigating climate change is greater or lower than the cost of the damages expected to be wrought by global warming.

Myron Ebell, director of global warming policy at the Competitive Enterprise Institute, a Washington think tank that received funding from Exxon Mobil, says global warming is too expensive to be worth addressing. Until recently, Ebell maintained global warming wasn’t taking place.²⁷ Now he concedes it’s real but that achieving meaningful emissions reductions will cost hundreds of trillions of dollars. That’s far more than even rich countries can afford, he says, and, in any case, considerably less than the cost of simply adapting to the new situation.

“By far the best strategy at present is to build resiliencies in societies so they are better able to handle environmental challenges,” Ebell argues. “Rather than promoting policies that would impoverish the world by putting it on an energy-starvation diet, [one] should be advocating policies that lead to wealthier and more creative societies . . . free markets, private property and the rule of law.”²⁸

Sir Nicolas Stern, former chief economist of the World Bank and head of Britain’s Government Economic Service, dismisses the concern about cost. Stern directed a 700-page study on climate change for the British government that was released in October 2006. It concluded that failure to act could wind up costing the world as much as 20 percent of its annual income — \$7 trillion — while greenhouse gas emissions could be brought under meaningful control for an annual cost of just 1 percent of global gross domestic product, or about \$350 billion.

Continued on p. 38

Chronology

1800s-1920s

Scientists sound early warnings about climate change.

1886

Swedish chemist Svante Arrhenius theorizes that carbon dioxide (CO₂) buildup caused by industrialization will warm the atmosphere.

1924

American physicist Alfred Lotka predicts that humans will double atmospheric CO₂ in 500 years.

1950s

Concern about greenhouse gases (GHG) grows.

1954

Embryo ecologist G. Evelyn Hutchinson of Yale University predicts deforestation will increase CO₂ levels.

1957

Climate-science pioneer David Keeling of the Scripps Institution begins monitoring CO₂ levels and finds them rising yearly.

1970s-1980s

Scientists predict sharp rises in temperatures and sea levels.

1979

First World Climate Conference in Geneva, Switzerland, calls on governments to prevent human-caused climate changes. . . . National Academy of Sciences warns a “wait and see” attitude may mean “waiting until it is too late.”

1985

Scientific conference in Villach, Austria, predicts sharp rise in

global temperatures and sea levels and calls for treaty to limit CO₂.

1988

U.N. establishes Intergovernmental Panel on Climate Change (IPCC).

1990s

Kyoto Protocol sets global goals for reducing use of fossil fuels.

1990

Pope John Paul II declares the greenhouse effect has reached “crisis proportions.”

1992

At summit in Rio de Janeiro 154 nations sign U.N. Framework Convention on Climate Change pledging to reduce GHG emissions to 1990 levels by 2000.

1994

Fearing catastrophic flooding, the Alliance of Small Islands States asks for a 20 percent cut in global GHG emissions by 2005. . . . Climate-change convention becomes effective, with 184 signatories.

1997

Climate convention signatories meet in Kyoto, Japan; adopt legally binding goals to cut greenhouse emissions to 5.2 percent below 1990 levels by 2012. . . . GOP-controlled U.S. Senate vows not to ratify resulting Kyoto Protocol.

1998

Despite the Senate action, Clinton administration signs treaty on Nov. 12.

2000s-Present

U.S. backs away from Kyoto

treaty. Antarctic glaciers begin to crumble; heat wave hits Europe.

2001

President George W. Bush repudiates Kyoto Protocol, reneging on campaign pledges. . . . National Academy of Sciences and 18 foreign counterparts say it’s “evident” human activities contribute to climate change.

2002

Antarctica’s gigantic Larsen-B ice shelf disintegrates. . . . Bush recommends tax incentives for companies to voluntarily reduce GHG emissions.

2003

Heat wave kills thousands in Europe.

2004

Swiss reinsurance company says global warming could cause \$150 billion in yearly damages. . . . Scientists report unexpectedly rapid warming of the Arctic region and predict half of its sea ice will disappear by 2010.

2005

Kyoto Protocol takes effect on Feb. 16 after ratification by Russia; U.S. and Australia are only industrialized non-participants.

2007

On Feb. 2 the IPCC declares with 90 percent certainty that human activity causes global warming. On March 9 European leaders agree unilaterally to cut overall greenhouse emissions to 20 percent below 1990 levels by 2020. Leaked IPCC draft says water shortages will affect hundreds of millions of Africans and tens of millions of Latin Americans within 20 years and more than 1 billion Asians by 2050. By 2080, millions more could face starvation, and up to 3 billion could face water shortages.

Inuit Confront Hard Reality

Melting Arctic ice is changing ancient ways

Like the residents of tropical Pacific atolls, the Inuit people of the High Arctic have a lot to lose from climate change. For them, however, profoundly disruptive changes are already underway.

Some parts of the Arctic — in Alaska, Western Canada and Eastern Russia — have warmed by 4 to 7 degrees Fahrenheit in the past 50 years, a single lifetime — causing the destruction of Inuit villages along with the sea ice that once protected them from winter storms. Ice and permafrost are no longer reliable, causing hunting deaths and damage to roads, infrastructure and forests.¹

“Climate change isn’t some abstract discussion or theory for us, it’s a harsh and stark reality we live with every day,” says Patricia Cochran, the Anchorage-based chair of the Inuit Circumpolar Conference (ICC), which represents 150,000 Inuit living in Greenland, Canada, Russia and Alaska. “Members of our community are dying because of extreme changes in sea and river ice conditions that are making it difficult for our people to hunt, trap, fish and snowmobile, which are critical activities for us.”

Inuit elders report that weather, and the location and characteristics of plant and animal species, are becoming increasingly unpredictable. Seals and other important game species that forage near the sea ice edge are in trouble, with serious economic consequences for Inuit hunting communities.

The village of Shishmaref, Alaska, was forced to move off an island because of erosion caused by powerful winter storms. Many others are not able to store meat the traditional way — burying it in the permafrost — because the Earth is no longer reliably cold enough.²

Inuit leaders spent years trying to get developed countries to act to curb their emissions, but their efforts in climate change summits were complicated by the fact that they, unlike small island states, do not have a nation-state and, therefore, no seat at the table. Shelia Watt-Cloutier of Iqaluit, Canada, attended the 2003 climate change summit in Milan but couldn’t get anyone to pay attention.

“I couldn’t even get our Canadian negotiators to express our views on the plenary floor,” recalls Cloutier, the past chair of the ICC. “We ended up asking Samoa” — a small island state — “to say something about the Arctic and, thankfully, they did.”

The Inuits’ relationship with both Canada and small island

states has since developed, but Inuit leaders have been discouraged by the world’s failure to act forcefully to reduce greenhouse gas emissions. In December 2005 they took a radical step, filing an official legal petition with the Inter-American Commission on Human Rights (IACHR), charging the United States with violating their human rights by not cutting emissions.

“This was not an act of aggression or anger, it was a gift of generosity from our hunters who see what is happening,” Cloutier says. “It’s meant to educate and inform and, yes, add pressure to the United States and other countries around the world to do the right thing.”



An Inuit woman from Igloolik hunts for seal in the melting ice of the Foxe Basin, near Canada's Baffin Island.

CQ Press/Pritt Vesilind

In November 2006, the Washington-based IACHR responded to the 163-page petition with a short letter saying “it will not be possible to process your petition at present.” The petition did not provide sufficient evidence to allow proper evaluation.

“I was shocked,” Cloutier says. “It wasn’t a ruling, it was sort of an ambiguous response.” The Inuit plan to continue to draw attention to the situation in the Arctic, at the IACHR and elsewhere, for as long as it takes.

¹ Petition to the Inter-American Commission on Human Rights: Violations resulting from global warming caused by the United States, Dec. 7, 2005, pp. 33-37.

² *Ibid.*

Continued from p. 36

“Costs of mitigation,” the Stern Review reads, “are small relative to the costs and risks of the climate change that will be avoided.”²⁹

Left to business as usual, the study says, greenhouse gas concentrations in the atmosphere could reach more

than triple their pre-industrial level by century’s end, potentially causing “a radical change in the physical geography of the world,” including sudden shifts in the pattern of monsoon rains in Asia, drying out of the Amazon rain forest and the destruction of ice caps with an attendant rise in sea

levels that would threaten the homes of 1 in 20 humans.

Far-northern nations such as Sweden, Russia and Canada will see net economic benefits through higher crop yields and lowered heating requirements, but much of the rest of the world will see net losses from floods, extreme weather

events and changes in environmental conditions.³⁰

"New Arctic shipping routes, a boom in trade with Russia, corn instead of wheat on the Prairies, golf instead of skiing in Ontario, Chardonnay instead of ice wine in Niagara, lower heating bills and fewer deaths due to pneumonia," writes Jacqueline Thorp in Toronto's *Financial Post*.³¹

But much of the rest of the world will see net losses from floods, extreme weather events and changes in environmental conditions. Even for Canada, there could be a grim tradeoff: Rising waters will inundate low-lying farmland in Canada's Maritime Provinces as well as in the Fraser River delta on the west coast, displacing millions of acres and hundreds of communities. Warmer temperatures will force farmers to plant new kinds of crops and allow the in-migration of warm-weather diseases such as Hantavirus, West Nile virus, chytrid fungus, dengue fever and Lyme disease.³²

The Stern Review suggests governments should enact measures that:

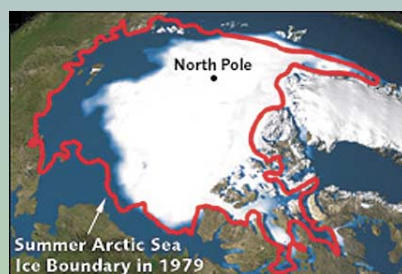
- Set up and expand ETS schemes that, in effect, put a price on greenhouse gas emissions;
- Encourage the development and adoption of renewable-energy technologies, and
- Establish energy-efficiency standards for buildings and appliances.

The report cautions that funds will still have to be spent to adapt to the changing climate — an estimated \$15 billion to \$50 billion a year among the 24 relatively wealthy nations that comprise the Organization for Economic Cooperation and Development (OECD) alone — but many of these investments represent infrastructure that will provide tangible benefits unrelated to climate change.³³

If the world does decide to take substantive action, is there money to be made from the technological revolution that would follow? "In general, it's hard to see an economic upside to responding

Arctic Ice Is Shrinking

The ice cap that usually covers the seas surrounding the North Pole is quickly receding, at the rate of 9 percent each decade. Since 1979, when ice filled out the area inside the red outline, it has withdrawn from the north shore of Alaska and the coastline of Siberia.



Sources: NASA and Natural Resources Defense Council

to global warming," says Raymond J. Kopp, a senior fellow at Resources for the Future in Washington. "But some companies will definitely be able to take advantage of this. It all depends on how you are positioned." Companies committed to the status quo, he notes, stand to lose ground to competitors that have a head start in adapting to a carbon-constrained world.

For example, Toyota has jumped to the head of the pack in developing low-emission cars. Its Prius, a gas-electric hybrid, is the market leader. In the United States, the dominant automobile market in the world, Toyota has had difficulty keeping up with demand for the mid-size Prius, which gets 45-50 miles to the gallon with substantially less emission than comparable conventional vehicles. Ironically, Toyota developed the Prius in an effort to catch up to General Motors (GM), which had invested billions in low-emission vehicles. But GM soon turned to large sport utility vehicles instead and is now losing sales to Toyota's more fuel-efficient cars.

In 2004, Toyota had a sales goal of 28,000 cars in the United States; instead it has sold at a rate of 110,000 annually, and the company expects to sell nearly 300,000 this year, once a new North American assembly line allows dealers to keep them in stock. It also sells well in Europe and Japan. "Many thought the Prius would get things started and fade away," says Toyota spokesman John Hanson. "Instead it has become an icon for what a hybrid is, and demand continues to increase."

Similarly, British energy giant BP, which supports efforts to curtail greenhouse gas emissions, is better positioned for a low-carbon future than Exxon Mobil, which opposes such action. BP is investing \$8 billion over the next decade in solar, combined-cycle gas turbines, hydrogen and wind technologies.

"We think the political commitment to renewables around the world will grow, and we'll have more of the answers than our competitors will," Chris Mottershead, BP's adviser on energy and the environment, told *The Economist*. "We're happier with our position than we were three years ago, because the world seems more inclined to change."³⁴

Billionaire CNN founder Ted Turner is also bearish on the economic opportunities offered by global warming. "The greatest fortunes in the history of the world will be made in this new energy business," Turner told the World Affairs Council in February in Houston, center of the U.S. oil business. ■

BACKGROUND

Complex Problem

Earth's climate has alternated between hot and cold, glacial and inter-glacial, for millions of years, a fact that gives comfort to those who downplay the dramatic warming of the



News-makers/Michel Porro

Environmental activists stack sandbags for a symbolic dike in The Hague, Netherlands, one of the lowest countries in the world. Knowing their vulnerability, the Dutch plan to spend as much as \$25 billion to upgrade their dike system in preparation for possible rises in sea-level elevations.

last few decades. They note that climate is affected by numerous factors, including latitude, elevation and proximity to the ocean, and is periodically disrupted by such anomalies as El Niño, the periodic rise in sea temperatures in the eastern Pacific.

As early as the 1890s, however, scientists speculated that the build-up of carbon dioxide in the atmosphere might be another cause of climate change. The process has been called the "greenhouse effect" although garden greenhouses work on different principles. The greenhouse effect is an increase in the temperature of the planet as radiant energy from sunlight is trapped in the atmosphere by carbon dioxide and other gases, collectively called "greenhouse gases." This dynamic keeps the surface of the planet warm, even when turned toward the cold void of space.

A global-warming problem exists because humans have been increasing the natural level of CO₂ by burning fossil fuels for power, heat and transportation and have added other greenhouse gases such as methane

(from refineries and animal feedlots) and chlorofluorocarbons (from refrigeration and air conditioners). There is now the equivalent of 60 percent more CO₂ in the atmosphere than before the Industrial Revolution.³⁵

Unfortunately, nobody knows exactly how the world's climate will behave as greenhouse gases increase. Although scientists feel confident of the general trend — more severe weather events, melting polar ice and changing sea levels and currents — knowing exactly how, when and where the changes will occur remains a matter of educated guesswork.

Meanwhile, scientists continue to study the problem. The United Nations Intergovernmental Panel on Climate Change has updated its predictions on the causes and consequences of climate change in 1995, 2000 and in February 2007. The latest update predicts that greenhouse gas emissions will cause the Earth to warm by 2 to 4.5 degrees Celsius by the end of the century, causing further reduction of winter snowfall and polar sea ice, stronger hurricanes and typhoons

and an increase in the frequency of heat waves and other extreme weather events. Sea levels could rise by one to two feet.

Bitter Debate

Countries have reacted in very different ways to such predictions. Europeans, by and large, have taken the threat seriously and invested accordingly. The United States has generally taken a wait-and-see approach, fearful of slowing economic growth. The current Republican administration, in particular, has been reluctant to take action until science can report with certainty that climate change is an imminent danger. Yet scientists warn that it is nearly impossible to provide certainty before it's too late for governments to take meaningful action. President George W. Bush also strongly believes that new technologies will solve the problem if the free market is allowed to respond on its own.

But political and scientific pressures convinced the president to address the issue in his State of the Union message in January 2007. Bush said that new energy technology would "help us to confront the serious challenge of global climate change." That was enough to encourage a raft of optimism from industries ready to ramp up alternative-energy projects. And the White House itself claimed that the president's new technology proposals will stop the projected growth in carbon-dioxide emissions from cars, light trucks and SUVs within 10 years.³⁶

The first international attempt to regulate greenhouse gases — the 1992 U.N. Framework Convention on Climate Change — sought to stabilize emissions at 1990 levels through voluntary measures. The United States ratified the agreement, and ultimately 189 nations signed on to it. Unfortunately, it became clear within a few years that voluntary pledges were not going to work. This led to the 1997 Kyoto Protocol, which featured legally binding cuts in emissions.

While the United States was deeply involved in creating the treaty — and signed it during the Clinton administration — the Republican-controlled Congress did not ratify it, in large part because it did not require emissions cuts from China and India. In March 2001, shortly after his inauguration, Bush repudiated the protocol on the grounds that it would hurt the U.S. economy, reneging on campaign pledges to require cuts in greenhouse gas emissions if elected.

Instead, he came out a year later with a plan offering tax incentives to get companies to voluntarily cut their emissions by 18 percent over 10 years. The scheme backfired; emissions increased steeply, discrediting the notion that voluntary targets could address the problem.³⁷

Other countries, notably the Netherlands, began preparing for the effects of climate change. With a quarter of its territory below sea level and much of the rest vulnerable to flooding, the country had little choice. The Dutch plan to spend an extra \$10 billion to \$25 billion to upgrade their vast network of dikes, pumping stations and sea defenses.

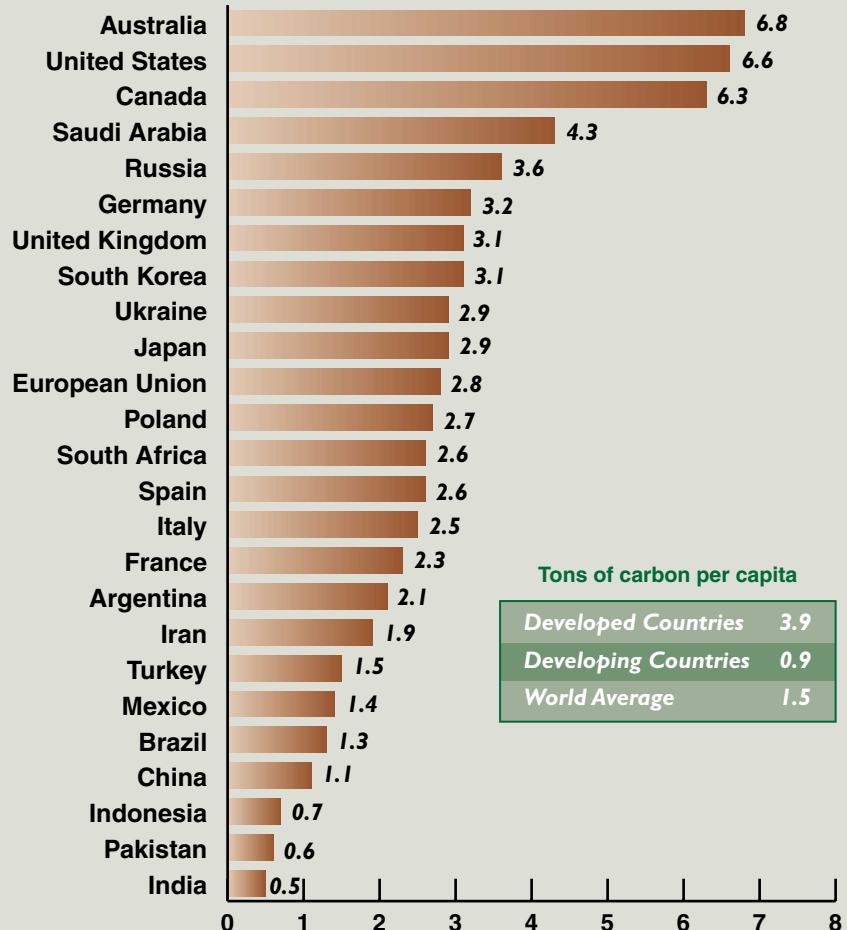
"It's better to be safe than sorry when you live below sea level," notes Peter C.G. Glas, director of inland water systems at Delft Hydraulics, which designed and built much of the dike infrastructure.³⁸

While the U.S. government dithered over improving the flood defenses of New Orleans, which is also largely below sea level, the Dutch were busy strengthening sea walls and modifying a large dam at the mouth of the Zuider Sea against a future sea-level rise.

The real threat to the Netherlands from global warming, however, isn't rising seas but surging rivers, Dutch experts say, because the country straddles the flood-prone Rhine River delta. Climate models suggest that rainfall in northern Europe could increase by 5 to 10 percent, while melting Alpine glaciers could increase the flow of rivers.

Top 25 Greenhouse-Gas Emitters

Australia emits 6.8 tons of carbon per year for every member of its 20 million population — the world's highest per-capita emissions rate. The United States is a close second, at 6.6 tons of carbon per capita — or about 1.9 billion tons. China, India and other rapidly developing nations have far-lower emissions rates.



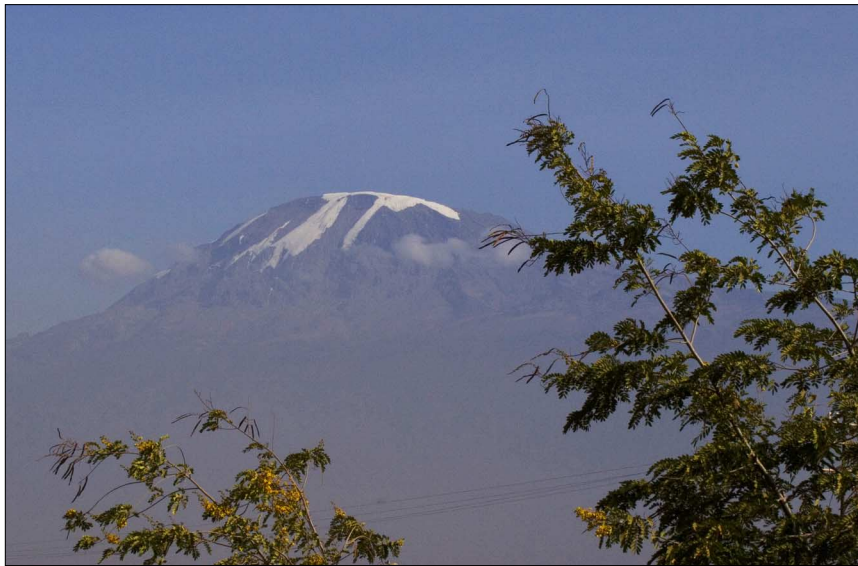
Source: Kevin Baumert, et al., "Climate Data: Insights and Observations," Pew Center on Global Climate Change, November 2004

Over the centuries, ever-higher dikes have been constructed to keep the river contained, but they've been proving less and less adequate with time. In 1995 the Rhine nearly breached the defenses, and with some dikes 20 feet high, failure would have caused catastrophic flooding.

The prospect of worsening floods has prompted the Dutch to change

tactics. Instead of building higher levees, the government plans to allow the rivers to flood certain areas when necessary. Some 220,000 acres of land will be surrendered to the rivers by 2050, creating a natural flood zone of marshlands and forest. An additional 62,000 acres will be made into pastures, from which livestock will be evacuated during floods.

Because the Netherlands is so densely populated, sacrificing all that land won't be easy, and engineers are trying to minimize the dislocations. Dura Vermeer, a Dutch construction company, has designed giant floating greenhouses, commercial buildings and even towns that can be deployed in the new sacrifice zones. Such planning is expected to be a growth industry.



Jennifer Prophet

The famed snows of Kilimanjaro are nearly gone. Global warming is blamed for the meltdown on Africa's highest peak, which lies near the Equator in Kenya.

"This could be the future for many countries," says Jeroen van der Sommen of the Delft-based Netherlands Water Partnership, which promotes the country's water know-how abroad.

Rapid Meltdown

Recent events — notably thawing in both polar regions — leads many scientists to fear far greater climate disruptions than even the IPCC has predicted.

One of the most dramatic events was the 2002 collapse of Antarctica's Larsen-B ice shelf, a 10,000-year-old, 650-foot-thick expanse of floating ice the size of Rhode Island. Pedro Skvarca, a glaciologist with the Argentine Antarctic Institute, flew over the shelf's seaward

edge as it decomposed.

"The surface of the ice shelf was almost totally covered by melt ponds and lakes, and waterfalls were spilling over the top," he recalls. Bits and pieces of the shelf had broken off, filling the Weddell Sea with bergs and slush. Two weeks later almost the entire shelf was gone. "It was unbelievable to see how fast it had broken up," Skvarca says.

"The coastline hadn't changed for more than 9,000 years and then it changed completely in just a few weeks."

Scientists say the collapse will likely have worldwide effects. The collapse of Larsen-B as well as the smaller Larsen-A and Wordie ice shelves was caused by a steep increase in summertime temperatures in the Antarctic Peninsula region. With the ice shelves gone, the far larger glaciers and ice sheets behind them have begun sliding into the sea between two and six times faster than before.

"The glaciers took off like race horses after the ice shelves were removed," says Ted Scambos, lead scientist at the National Snow and Ice Data Center in Boulder, Colo. "We're seeing things that we didn't think glaciers could do in terms of the speed of their response." Similar changes have been recorded in the

Amundsen Sea in West Antarctica, where glaciers drain the West Antarctic Ice Sheet, a precariously balanced portion of the southern ice cap containing enough ice to raise world sea levels by 20 feet.³⁹

In the Arctic, warmer winter temperatures have caused the rapid thinning of the Greenland Ice Sheet, a reduction of Arctic Sea ice and the thawing of permafrost. The thawing has damaged roads, buildings, pipelines and airports in Russia and shrunk the Alaskan ice-road season to 100 days a year, down from 300 just 30 years ago. In addition, melting permafrost releases carbon dioxide trapped underneath, adding to atmospheric CO₂ levels and speeding up global warming even faster than expected.

The loss of sea ice is leaving polar bears with fewer places to hunt, and in late 2006 the Bush administration placed them on the endangered species list.⁴⁰ ■

CURRENT SITUATION

Frustration in Europe

In Europe there is increasing impatience with the United States, not only because Washington has failed to regulate greenhouse gas emissions but also because that failure has put European industry at a competitive disadvantage. "Right now, the EU is on its way, but the U.S. and the rest of the world are still in the station," says Kopp of Resources for the Future. "At the end of the day, EU nations are in a global economy, so they can't run too far ahead of the U.S. or they will disadvantage their economy too much and run into political problems. They need U.S. involvement."

Continued on p. 44

Should a trade tax be imposed on the U.S. and other countries that don't sign the Kyoto Protocol?



JOHN HONTELEZ
*SECRETARY-GENERAL,
EUROPEAN ENVIRONMENTAL BUREAU,
BRUSSELS, BELGIUM*

WRITTEN FOR *CQ GLOBAL RESEARCHER*, JANUARY 2007

if we are serious about Europe taking the lead and fulfilling its Kyoto obligations, border tax adjustments based on carbon emissions are one of the few easy ways to ensure we do not simply become a hostage of those countries that don't see that fighting climate change is necessary.

I am very much in favor of taking measures with the United States and Australia, two countries that should have accepted Kyoto and are really acting irresponsibly toward the global population.

But you can't use this tax in the same way for products from China and India and so on because these countries haven't made or violated Kyoto Protocol commitments, and in 1997 it was quite right not to require them to make the same commitments as developed nations.

The tax would increase the possibilities for the European Union (EU) to achieve greater greenhouse gas reductions without damaging important parts of our industry. It would also show the outside world that the EU is very serious about climate policies, even understanding that it is very difficult, in practice, to measure the CO₂ inputs of the products that are being considered.

For example, if you use aluminum for cans or pipes that are produced in Europe, the cost includes the CO₂ emissions right that this company has had to buy. So the price includes their payment down on the mechanisms to reduce CO₂ emissions, while the products outside the EU aren't including that cost. A border tax adjustment would prevent that. You ensure that all the EU aluminum products are not wiped out simply for the reason that other countries are not reducing CO₂.

The money generated from this tax would probably go to a kind of export support for products that are leaving the EU. It's not what I would like to have happen, but for the sake of compromise, I suppose the money has to go both ways.

The refusal of the U.S. administration to implement Kyoto has a devastating effect because now we see what the fast-developing countries like China, India and Brazil are doing, and of course we should not put the same restrictions on them. Nevertheless, it is an issue, of course.

But as long as the U.S. is not joining in the effort, these countries will have all the reasons in the world to say: Why should we limit our economic development and start controlling emissions when the world is refusing to take part? That's the message the U.S. sends to the rest of the world.



PETER MENDELSON
TRADE COMMISSIONER, EUROPEAN UNION

FROM SPEECH TO EU, BRUSSELS, DEC. 18, 2006

we in the developed world are responsible for 80 percent of historical carbon emissions. We have an historical environmental debt, as well as a self-interest in our own survival, which both mean we must lead in finding solutions.

Our leadership is necessary. But it is not enough. China will become the biggest emitter of CO₂ in or around 2010. A billion Indians will not be far behind. And assuming that countries like China, India and Brazil continue to move towards Western levels of economic growth, we are confronted with the urgent challenge of greening that growth.

I see three essential parts to the political challenge we face. The first is public education to build a constituency for difficult change and break current patterns of behavior. The second challenge is greater efficiency in the way we use energy. We also need to help China, India and others dramatically to improve their energy efficiency. The third outstanding challenge is to lower greenhouse gas emissions.

But it is also essential to establish that economic growth — and the trade that drives it — are not inherently at odds with sustainable climate policy. Economic growth is what gives us the resources to manage the human impact on the environment at the local level. But growth's impact on the environment will have to change. Efficiency gains can help. But we have to do more than stabilize our impact — we need to reverse it. We will not achieve this without a global shift to renewable-energy sources and green technologies. And here trade policy has an important role.

There is one trade-policy response to climate change about which I have serious doubts. That is the idea of a specific "climate" tariff [or "border" tax] on countries that have not ratified the Kyoto Protocol. This would be highly problematic under current WTO [World Trade Organization] rules. I also suspect it would not be good politics.

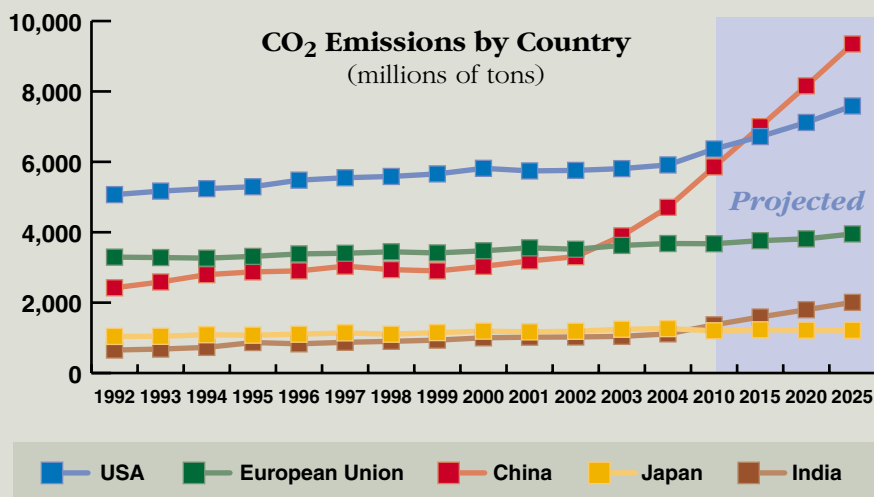
Not participating in the Kyoto process is not illegal. Nor is it a subsidy under WTO rules.

How would we choose what goods to target? China has ratified Kyoto but has no Kyoto targets because of its developing-country status. The U.S. has not ratified, but states like California have ambitious climate-change policies.

Above all, dealing with climate change is an international challenge. It requires international cooperation. Coercive policies will harm this. Collective responsibility will only be fostered by policies of dialogue, incentive and cooperation.

Carbon Dioxide Emissions of Major Economies

Despite Kyoto Treaty carbon-reduction goals established by 169 nations in 2005, major economic powers have largely failed to reduce carbon emissions. The United States, not a signatory to the treaty, shows a steady rise, while EU and Japanese emissions have flattened out. Emerging giant China presents the most precipitous climb in emissions as it industrializes.



Source: "Climate Change 101: International Action," Pew Center on Global Climate Change

Continued from p. 42

Some European countries are tired of waiting. In November 2006 the EU's high-level group on competitiveness, energy and the environment proposed introducing a "border" tax on products imported from countries that have not signed the Kyoto Protocol. The measure, which has the backing of French Prime Minister Dominique de Villepin and EU Vice President for Enterprise and Industry Gunter Verheugen, of Germany, aims to even the playing field for European industries, which have incurred the costs of participating in the European emissions trading scheme.⁴¹

"It's an idea that's gaining momentum, but it's also very controversial," says John Hontelez, secretary-general of the European Environmental Bureau in Brussels. "If you are serious about Europe taking the lead and fulfilling its Kyoto obligations, a border-tax adjustment is one of the few easy ways to ensure you

do not simply become a hostage of those countries that don't see that fighting climate change is necessary."

Hontelez, who heads a federation of more than 140 European environmental organizations, favors enacting a tax against the United States and Australia, the only other industrial nation to reject the Kyoto Protocol, but not against developing countries like China. "The U.S. and Australia are really acting irresponsibly toward the global population," he says.

But EU Trade Commissioner Peter Mandelson, of Great Britain, opposes the proposal. "Not participating in the Kyoto process is not illegal," he said in a December 2006 speech. "Collective responsibility will only be fostered by policies of dialogue, incentive and cooperation" rather than "coercive measures."

It is also unclear if the measure would be allowed under World Trade Organization (WTO) rules, which pre-

vent foreign products from being treated differently than domestic ones.⁴²

But Hontelez says the EU should consider the measure regardless of what the WTO allows. "I don't think trade has a higher moral standing than fighting for sustainable development and against climate change," he explains. "It's irresponsible not to act because we have some trade rules."

China's Efficiency Drive

While China's government has resisted mandatory CO₂ reductions, it is extremely concerned about reducing pollution and increasing energy efficiency. The primary motivation is economic: If current trends continue, the combined costs of acid rain, dirty air and rampant energy consumption could slow the country's phenomenal growth.

To meet energy demands, China builds a new power plant every week, on average. That's enough additional capacity every year to power a country the size of England. Since 70 percent of China's electricity comes from burning coal, the effect on the environment is baleful. Sulfur-dioxide pollution — another by-product of burning coal — contributes to 400,000 premature deaths a year and produces the acid rain that now falls on a third of China, damaging lakes, forests and crops. If coal-consumption trends continue, officials worry pollution effects will become untenable.⁴³

"If China wants to continue to grow, they need more energy, and one way to deal with that is with greater energy efficiency," says Kiang of Peking University, noting that the country uses energy only a tenth as efficiently as Japan. "China wants to do something to improve its energy efficiency, and in the end that will improve the climate-change situation even though it was not the original target."

Under its 11th five-year plan, issued in 2006, the Chinese government has set some of the world's most aggressive ef-

efficiency targets, including a 20 percent cut in energy use per unit of gross domestic product (GDP) by 2010. New regulations include automobile fuel-efficiency standards that are higher than those in the United States and construction codes that encourage the use of insulated windows and efficient lighting.

In addition, China intends to generate 16 percent of its energy from renewable sources by 2020. State-owned utilities are building wind farms. In Dunhuang, the construction of a 100-megawatt solar-generating plant — one of the world's largest — should prevent 400,000 tons of greenhouse gas emissions each year.⁴⁴

"The government pays more attention to climate change now because it is expected to have a huge impact on water resources," says Liu of Michigan State and the Chinese Academy of Sciences. "Water shortages are already a serious problem in northern China, while southern China is afflicted by flooding. In the long term, the government will be very interested and willing to reduce emissions of greenhouse gases."

"The government is fully aware of the possible impacts of climate change on China," says Kiang. "But the climate-change issue hasn't reached the general public" in large part because of the small number of non-governmental organizations, the sector that focused attention on the issue in the West.

For now, at least, the government rejects international calls for mandatory greenhouse gas cuts, citing fairness. "You cannot tell people who are struggling to earn enough to eat that they need to reduce their emissions," said Lu Xuedu, deputy director general of China's Office of Global Environmental Affairs, in October 2006.⁴⁵

Son of Kyoto

Delegates to a climate change summit in Nairobi, Kenya, in 2006

sought to construct a successor agreement to the Kyoto Protocol but were handicapped by the non-participation of the United States, the world's largest emitter of man-made greenhouse gases.

"We're living in this two-track world at the moment," says Winkler of the University of Cape Town. "We're expected to build on the architecture of the Kyoto Protocol, but without U.S. participation, we can't expect any engagement from the big developing countries."

Delegates were unable to reach agreement on a timetable for future emission cuts or other key elements, and many expressed frustration with the U.S. policy articulated by Undersecretary of State Paula J. Dobriansky, who maintained that the best way to address climate change was through voluntary international partnerships "that are integrated with economic growth."⁴⁶

China indicated it was not ready to adopt mandatory cuts, while India's environment minister said it was "surreal" to expect his country to slash emissions when its per capita emissions are so much lower than those of the developed world and so many of its people live in poverty.

The Bush administration's newest climate policy is centered not on the Kyoto process but on the new Asia-Pacific Partnership on Clean Development, which promotes the development of clean-energy technologies by the private sector. Created in July 2006, the initiative involves the United States, Australia, China, India, South Korea and Japan and features no mandatory emissions limits. Administration officials say it is a "growth-oriented strategy" that "enables investment in the technologies and practices we need to address these important issues."⁴⁷

"The fairness and effectiveness of this proposal will be superior to the Kyoto Protocol," said Australian Prime Minister John Howard. "It demonstrates the very strong commitment of Australia to reducing greenhouse gas emissions, according to an understanding that it's

fair in Australia and not something that will destroy Australian jobs and unfairly penalize Australian industries."⁴⁸

For Schneider of Stanford's Center for Environmental Science and Policy, the most revealing element of the Bush administration plan was the amount it pledged to invest in the project: \$50 million — less than the cost of a single clean-energy power plant. "That number is off by a factor of a hundred," he says. "They put up nothing. This is purely cover. If they truly have a climate policy they had better make some real investments, many billions a year." ■

OUTLOOK

Will the U.S. Act?

The future direction of international climate policy clearly is tied to domestic U.S. politics. Advocates for robust action say meaningful progress can only occur if and when the United States engages with the issue. They are encouraged, however, by growing signs that opinion in Washington is shifting toward action.

Former Vice President Al Gore's Academy Award-winning documentary on global warming, "An Inconvenient Truth," has focused public opinion on the issue, and the takeover of Congress by the Democrats increases prospects for congressional action on climate change. New House Speaker Nancy Pelosi appointed a Select Committee on Energy Independence and Global Warming to recommend legislation.

"[House] debate on global warming has been stifled for 12 years," said Pelosi, a California Democrat. "We can't wait any longer."⁴⁹

In the Senate, global-warming naysayer James M. Inhofe, R-Okla., was replaced as chairman of the Senate Environment and Public Works Committee

by Barbara Boxer, another California Democrat and a strong advocate of climate action. At least four climate-change measures have been introduced in the Senate so far in 2007, mostly to establish a carbon-emission trading system.

"Things are moving right now at an incredibly quick pace," said Antonia Herzog, a scientist with the Natural Resources Defense Council. But even if both chambers were to pass legislation this year, it is unclear whether Bush would sign such a measure.⁵⁰

Pushing for action in Congress is an unlikely alliance of environmentalists, evangelical Christians and large companies seeking to burnish their good-citizen images and get a consistent national policy to replace the growing patchwork of state carbon-emission limits. In January the United States Climate Action Partnership (USCAP) — a coalition of nearly a dozen energy companies and environmental activists — called for action to "slow, stop and reverse the growth of greenhouse gas emissions over the shortest period of time reasonably achievable."⁵¹

A wide range of religious leaders — from the Ecumenical Patriarch of the Christian Orthodox churches, Bartholomew I, to the more than 60 Jewish, Catholic, evangelical and mainstream protestant organizations in the National Religious Partnership for the Environment — are also pushing for action on global warming.

"Climate change was seen early on as the preeminent environmental challenge for people of faith," explains partnership Executive Director Paul Gorman.

"It's deep religious insight and conviction that's moved this thing along."⁵²

Meanwhile, many states have taken the issue into their own hands, creating regional emissions-trading schemes for power plants in the Northeast and in West Coast states.

Five Western governors announced on Feb. 26 that they would set limits on their emissions. Even in conservative Texas, the previously anti-global-warming power company TXU has agreed to be sold to a private investor group that plans to halt the building of coal-fired power plants and adopt green strategies.

Arnold Schwarzenegger, the Republican governor of California, said in June 2006 that the global-warming debate is over. "We know the science, we see the threat, and the time for action is now," he said, adding that his state would be "the leader in the fight against global warming."⁵³

International observers hope that there will be major progress at the federal level in the United States after the 2008 presidential elections. "I see the U.S. leading in not very long," says Ott at the Wuppertal Institute in Germany. "The EU is very timid and cautious as an actor on the world stage. The U.S. often takes a long time to act, but when it does, it does it in full-scale. That gung-ho, 'we can do it' mentality would be helpful." ■

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About the Author

Colin Woodard is a journalist who writes for *The Christian Science Monitor* and *The Chronicle of Higher Education*, and has reported from more than 40 foreign countries and six continents, and lived for more than four years in Eastern Europe. He is the author of *Ocean's End: Travels Through Endangered Seas*, a narrative non-fiction account of the deterioration of the world's oceans.

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Arctic Climate Impact Assessment, University of Alaska — Fairbanks, P.O. Box 747740, Fairbanks, AK 99775; www.acia.uaf.edu. International project of the Arctic Council and International Arctic Science Committee for evaluating knowledge on climate variability, climate change and increased ultraviolet radiation.

Intergovernmental Panel on Climate Change, 7bis Avenue de la Paix, C.P. 2300, CH-1211 Geneva 2, Switzerland; (+41)-22-730-8208; www.ipcc.ch. U.N.-sponsored organization of scientists who assess findings on global warming.

Inuit Circumpolar Conference, 170 Laurier Ave. W., Suite 504, Ottawa, Ontario, Canada K1P 5V5; (613) 563-2642; inuitcircumpolar.com. International non-governmental organization representing 150,000 Inuit of Alaska, Canada, Greenland and Russia.

Pew Center on Global Climate Change, 2101 Wilson Blvd., Suite 550, Arlington, VA 22201; (703) 516-4146; www.pewclimate.org. Nonprofit organization that issues information and promotes policy discussion of global warming.

Resources for the Future, 1616 P St., N.W., Washington, DC 20036; (202) 328-5000; www.rff.org. Non-partisan think tank conducting independent research on environmental, energy and natural resource issues.

U.N. Environment Programme, United Nations Ave., Gigiri, P.O. Box 30552, 00100, Nairobi, Kenya; (254-20) 7621234; www.unep.org. Voice for the environment in the U.N. system.

Wuppertal Institute for Climate, Environment and Energy, Döppersberg 19, 42103 Wuppertal, Germany; +49 (0)202/2492-0; www.wupperinst.org. German research organization working towards sustainable development.

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CITING CQ GLOBAL RESEARCHER

Sample formats for citing these reports in a bibliography include the ones listed below. Preferred styles and formats vary, so please check with your instructor or professor.

MLA STYLE

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Voices From Abroad:

IAN CAMPBELL
ENVIRONMENTAL
MINISTER, AUSTRALIA
JULY 2006

Don't lecture Australia on Kyoto.

"We do get lectured from time to time here in Queensland, in Australia, by Europeans and others that we should've signed Kyoto as some sort of magic silver bullet. . . . Unfortunately Kyoto ignored almost totally around 70 percent of the world's emissions.

MIKHAIL GORBACHEV
FORMER PRESIDENT,
SOVIET UNION
OCT. 2006

We have very little time to act.

"When we speak of the environment, we say that the situation is five minutes to midnight. We are already in a global environmental crisis. The atmosphere has been polluted and it has had an impact on the global climate. We see the shrinking of arable land, deforestation . . . the pollution of the ocean.

WORLDPRESS.ORG
JÓN KNÚTUR
ÁSMUNDSSON, ICELAND
FEB. 15, 2002

Iceland the Kuwait of the North?

"By the year 2040, scientists and politicians envision Iceland as the first country that will be almost entirely

free from fossil fuel. It is a heady dream, but . . . [it is] the hope that the country will one day be known as the "Kuwait of the North."

JAMES LOVELOCK
THE INDEPENDENT,
GREAT BRITAIN
FEB. 2006

China builds too fast.

"It is most unlikely that anything we do as individuals or even as a nation will significantly reduce climate change. The United Kingdom produces only 2 per cent of global emissions. You have to ask, will any gesture we make stop the Chinese, for example, building a giant coal-burning power station every five days?"

DR. LOUIS VERCHOT
WORLD AGROFORESTRY
CENTER, KENYA
FEB. 2007

Devastating for agriculture.

"The impacts on agriculture in developing countries, and particularly on countries that depend on rain-fed agriculture, are likely to be devastating."

SYDNEY MORNING
HERALD
REUTERS
JAN. 2007

Pitting people against each other?

"Global warming could exacerbate the world's rich-poor divide and help to rad-

icalise populations and fan terrorism in the countries worst affected. . . ."

STAVROS DIMAS
EU ENVIRONMENTAL
COMMISSIONER,
BERLINER ZEITUNG
MARCH 2007

Turn off the TV.

"Every individual contributes to greenhouse gas emissions. If we use energy-saving light bulbs or turn off the stand-by mode for televisions, then we will not only lower emissions, but also save money."

JIANG YU
FOREIGN MINISTRY OF
CHINA, REUTERS
FEB. 2007

Don't blame us.

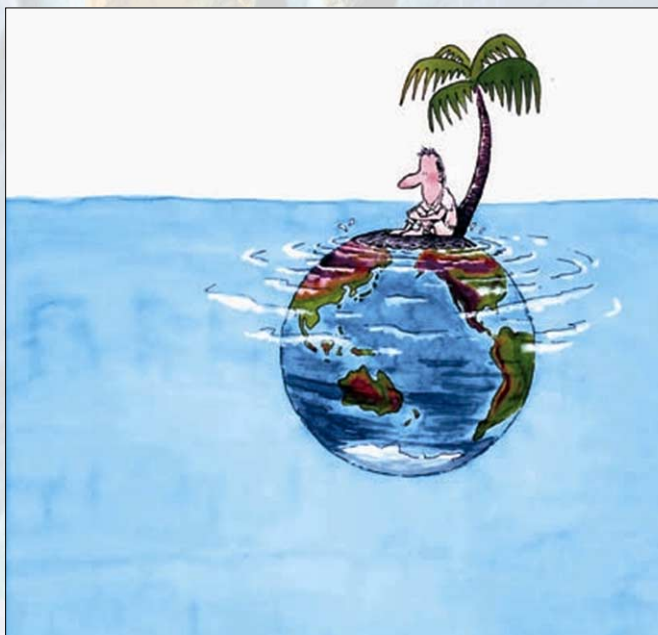
"Climate change has been caused by . . . developed countries and their high

per-capita emissions. Developed countries bear an unshirkable responsibility."

HOUSE OF LORDS
SELECT COMMITTEE ON
ECONOMIC AFFAIRS
UNITED KINGDOM
JULY 2005

Doubts on IPCC approach.

"We have some concerns about the objectivity of the [International Panel on Climate Change] process, with some of its emissions scenarios and summary documentation apparently influenced by political considerations. There are significant doubts about some aspects of the IPCC's emissions scenario exercise. The government should press the IPCC to change their approach. There are some positive aspects to global warming and these appear to have been played down in the IPCC reports."



Yukiyaishi, Japan